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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/408,366	09/29/1999	KEISUKE HASHIMOTO	018775-765	3976
21839	7590	12/07/2004	EXAMINER	
BURNS DOANE SWECKER & MATHIS L L P			DASTOURI, MEHRDAD	
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ALEXANDRIA, VA 22313-1404			PAPER NUMBER	
			2623	
DATE MAILED: 12/07/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/408,366	HASHIMOTO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Mehrdad Dastouri	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 June 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 8-15 and 17-20 is/are rejected.
- 7) ☒ Claim(s) 5-7 and 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

#### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 30, 2004 has been entered.

#### ***Response to Amendment***

2. Applicants' amendment filed June 30, 2004, has been entered and made of record.
3. Applicants' arguments have been fully considered but they are moot in view of new grounds of rejection.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4 and 8-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al., (hereinafter Suzuki), (U.S. 5,862,257) in view of Silver et al., (hereinafter Silver), (U.S. 6,408,109).

Regarding Claim 1, Suzuki discloses an image processor which processes grayscale image data on density levels of pixels, comprising:

an edge judgment circuit which discriminates an edge direction of a target pixel from the density level of the target pixel and adjacent pixels thereof based upon the grayscale image data (Column 3, Lines 6-14; Column 6, Lines 12-25; Figures 41E-41F and 42; Column 18, Lines 42-55; Column 19, Lines 27-67); and

a density level determining circuit which determines grayscale density levels in a plurality of sub-pixels in the target pixel, where the target pixel is divided into the sub-pixels, in accordance with the density level of the target pixel and the edge direction of the target pixel discriminated by the edge judgment circuit (Figures 2A-2B, 3A-3B, 4A-4D and 5; Column 5, Lines 1-67, particularly, Lines 13-24 and 41-52).

Suzuki does not explicitly disclose discriminating an edge direction of a target pixel from the differences in density level between the target pixel and adjacent pixels.

Edge detection based on the difference of the intensities of the adjacent pixels is well known in the art as disclosed by Silver.

Silver et al disclose an apparatus for detecting and sub-pixel location of edges in digital images comprising discriminating an edge direction of a target pixel from differences in density level between the target pixel and adjacent pixels thereof based upon the grayscale image data (Figures 1A-1D; Column 6, Lines 1-63, in particular Lines 30-39).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Suzuki's invention according to the teachings of Silver to

Art Unit: 2623

discriminate edge direction of a target pixel from differences in density level between the target pixel and adjacent pixels thereof based upon the grayscale image data because it is a conventional methodology routinely implemented in the art based on the fact that the components of image gradient in a given direction (differences in density level) is the first derivative of image brightness (Silver et al; Column 6, Lines 21-29).

Regarding Claim 2, Suzuki further discloses the image processor according to Claim 1, wherein the density level determining circuit comprises:

a density controller circuit which sets density-level setting parameters for each of the sub-pixels in the target pixel in accordance with the edge direction of the target pixel discriminated by said edge judgment circuit (Figures 9-15, Controller 200; Column 5, Lines 1-53; Column 7, Lines 25-52); and

a density-level setter circuit which sets the density level of each of the plurality of sub-pixels in the target pixel based upon the density level of the target pixel by using the parameters set by said density controller circuit (Figures 9-15, Controller 200; Column 5, Lines 1-53; Column 7, Lines 54-67, Column 8, Lines 1-6).

Regarding Claim 3, Suzuki does not explicitly disclose the image processor according to Claim 1, wherein said edge judgment circuit discriminates a first edge which represents that an edge of a character image exists in a first direction relative to the target pixel, a second edge which represents that an edge of a character image exists in a second direction opposite to the first direction relative to the target pixel, and a narrow edge which represents that a character image exists at a center of the target pixel

Silver discloses the image processor according to Claim 1, wherein said edge judgment circuit discriminates a first edge which represents that an edge of a character image exists in a first direction relative to the target pixel, a second edge which represents that an edge of a character image exists in a second direction opposite to the first direction relative to the target pixel, and a narrow edge which represents that a character image exists at a center of the target pixel (Figures 3A-3C; Column 3, Lines 56-67, Column 4, Lines 1-2; Column 12, Lines 22-56).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Suzuki's invention according to the teachings of Silver to discriminate edges in different directions because it is a conventional methodology routinely implemented in the art based on the fact that edges in a digital image are the components of image gradient in a given direction (differences in density level) obtained from the first derivative of image brightness (Silver et al; Column 6, Lines 21-29).

Regarding Claim 4, Suzuki does not explicitly disclose the image processor according to Claim 1, wherein said edge judgment circuit cancels the discriminated edge direction when the density level of a pixel adjacent to the target pixel in the edge direction is larger than a threshold value.

Silver discloses an apparatus for detecting and sub-pixel location of edges in digital images comprising an edge-direction detecting circuit that cancels the discriminated edge direction when the density level of a pixel adjacent to the target pixel in the edge direction is larger than a threshold value (Figures 4A-C, 5 and 6; Column 13, Lines 54-67, Column 14, Column 15, Lines 1-30; Tables 3-5).

Art Unit: 2623

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Suzuki's invention according to the teachings of Silver to cancel the discriminated edge direction when the density level of a pixel adjacent to the target pixel in the edge direction is larger than a threshold value because it will enhance the direction of the extracted edge by increasing the accuracy of detection which will in turn result in improving the quality of the detected edges.

Regarding Claim 8, Suzuki does not explicitly disclose the image processor according to Claim 1, further comprising an edge judgment correction circuit connected to said edge judgment circuit and corrects the edge direction when the edge direction discriminated by said edge judgment circuit is not appropriate.

Silver discloses an apparatus for detecting and sub-pixel location of edges in digital images comprising an edge judgment correction circuit connected to the edge judgment circuit and corrects the edge direction when the edge direction discriminated by the edge judgment circuit is not appropriate (Column 3, Lines 19-36).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Suzuki's invention according to the teachings of Silver to incorporate further limitations of Claim 8 because it will enhance the extracted edge direction and improve the quality of the detected edges.

With regards to Claim 9, arguments analogous to those presented for Claim 2 are applicable to Claim 9.

Art Unit: 2623

Regarding Claim 10, Suzuki does not disclose utilizing filtering operation for smoothing image data incorporating a specific filtering process.

Silver discloses smoothing on image data of the pixel, on which the edge judgment circuit discriminates an edge, by using an asymmetric filter having the target pixel at a center thereof (Figures 1A-1D; Column 6, Lines 30-63).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Suzuki's invention according to the teachings of Silver to perform further limitations recited in Claim 10 because it is a conventional methodology routinely implemented in the art as a enhancement preprocessing step to attenuate high frequency details of the image.

With regards to Claim 11, arguments analogous to those presented for Claim 2 are applicable to Claim 11.

Regarding Claim 12, Silver further discloses the image processor according to Claim 10, wherein said filter is asymmetrical with respect to a direction perpendicular to which a pixel is divided into sub-pixels (Figures 1A-1D; Column 6, Lines 30-63).

Regarding Claim 13, Silver further discloses the image processor according to Claim 10, wherein said smoothing circuit comprises a plurality of filters and selects one of them for smoothing (Figures 1A-1D; Column 6, Lines 30-63).

Regarding Claim 14, Silver further discloses the image processor according to Claim 10, wherein said smoothing circuit comprises a plurality of filters and selects one of the filters which provides a minimum density level of the target pixel after the smoothing carried by the filters (Figures 1C-1D; Column 6, Lines 51-63).



Regarding Claim 15, arguments analogous to those presented for Claim 1 are applicable to Claim 15.

With regards to Claim 17, arguments analogous to those presented for Claim 8 are applicable to Claim 17.

With regards to Claim 18, arguments analogous to those presented for Claim 10 are applicable to Claim 18.

Regarding Claim 19, arguments analogous to those presented for Claims 1 and 2 are applicable to Claim 19.

Regarding Claim 20, arguments analogous to those presented for Claims 1 and 4 are applicable to Claim 20.

***Allowable Subject Matter***

6. Claims 5-7 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 of the instant invention recites the image processor according to Claim 1, further comprising:

a line width judgment circuit, which determines a width of a line including the target pixel;

a smoothing circuit which performs smoothing on the image data of the target pixel and the adjacent pixels thereof in accordance to the line width determined by said

Art Unit: 2623

line width judgment circuit and outputs the image data of the target pixel which have been smoothed;

wherein the density level determining circuit determines the density levels in the plurality of sub-pixels in accordance with the density level of the target pixel subjected to smoothing by said smoothing circuit and the edge direction of the target pixel discriminated by the edge judgment circuit.

Claims 6 and 7 depend on Claim 5, and are therefore allowable.

Claim 16 recites analogous allowable subject matter as Claim 5, and is therefore allowable.

The features identified are neither discussed nor suggested by the prior arts of record.

***Other prior art cited***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,341,153 to Benzschawel et al.;

U.S. Patent 6,597,363 to Duluk et al.

***Contact Information***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m..

Art Unit: 2623

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mehrdad Dastouri  
Primary Examiner  
Group Art Unit 2623  
December 6, 2004

MEHRDAD DASTOURI  
PRIMARY EXAMINER

*Mehrdad Dastouri*